	ID	Title	Description	Current Capabilities	Needed Capabilities
Optical Performance and Model Validation	S-2	Optical Performance Demonstration and Validated Optical Model	Experimentally validate the equations that predict the contrasts achievable with a starshade.	$3x10^{-10}$ contrast at 632 nm, 5 cm mask, and ~500 Fresnel #; validated optical model $9x10^{-10}$ contrast at white light, 58 cm mask, and 210 Fresnel #	Experimentally validate models predicting contrast to ≤ 10^{-10} just outside petal edges in scaled flight-like geometry with Fresnel numbers ≤ 20 across a broadband optical bandpass.
	S-1	Controlling Scattered Sun Light	Limit edge-scattered sunlight and diffracted starlight with optical petal edges that also handle stowed bending strain.	Machined graphite edges meet all specs but edge radius (10 um); etched metal edges meet all specs but in-plane shape tolerance (Exo-S design).	Integrated petal optical edges maintaining precision in-plane shape requirements after deployment trials and limiting contrast contribution of solar glint to < 10^{-10} at petal edges.
Formation Sensing and Control	S-3	Lateral Formation Sensing	Demonstrate lateral formation flying sensing accuracy consistent with keeping telescope in starshade's dark shadow.	Centroid star positions to ≤ 1/100th pixel with ample flux. Simulations have shown that sensing and GN&C is tractable, though sensing demonstration of lateral control has not yet been performed.	Demonstrate sensing lateral errors ≤ 0.30 m accuracy at scaled flight separations (±1 mas bearing angle). Estimated centroid positions to ≤ 1/40th pixel with limited flux from out of band starlight. Control algorithms demonstrated with scaled lateral control errors corresponding to ≤ 1 m.
Deployment Accuracy and Shape Stability	S-5	Petal Positioning Accuracy and Opaque Structure	Demonstrate that a starshade can be autonomously deployed to within its budgeted tolerances after exposure to relevant environments.	Petal deployment tolerance (≤ 1 mm) verified with low fidelity 12m prototype and no optical shield; no environmental testing (Exo-S design).	Deployment tolerances demonstrated to ≤ 1 mm (in-plane envelope) with flight-like, minimum half-scale structure, simulated petals, opaque structure, and interfaces to launch restraint after exposure to relevant environments.
	S-4	Petal Shape and Stability	Demonstrate a high-fidelity, flight-like starshade petal meets petal shape tolerances after exposure to relevant environments.	Manufacturing tolerance (≤ 100 μm) verified with low fidelity 6m prototype and no environmental tests. Petal deployment tests conducted but on prototype petals to demonstrate rib actuation; no shape measurements.	Deployment tolerances demonstrated to ≤ 100 μm (in-plane envelope) with flight-like, minimum half-scale petal fabricated and maintains shape after multiple deployments from stowed configuration.